

MASTER OF SCIENCE IN METEOROLOGY

THE NUMERICAL WEATHER PREDICTION SYSTEM AT THE ITALIAN AIR FORCE WEATHER SERVICE: IMPACT OF NON-CONVENTIONAL OBSERVATIONS AND INCREASED RESOLUTION

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The impact of non-conventional observations and increased horizontal resolution on the numerical weather prediction (NWP) system of the National Center for Aeronautic Meteorology and Climatology of the Italian Air Force (CNMCA) has previously been investigated in other research. The present study is part of ongoing research activities seeking to improve CNMCA's operational numerical weather prediction capabilities through the assimilation of non-conventional observations. Additional data are derived from satellite observations, such as 10 m wind retrieved from Quikscat polar-orbit satellite, atmospheric motion vectors (AMVs) from Meteosat geostationary satellites, and manual and automated aircraft observations. The NWP system is in operational use and is based on an "observation space" version of the 3D-Var method for the objective analysis component (3D-PSAS), while the prognostic component is based on the High Resolution Regional Model (HRM) of the German Meteorological Service (DWD). The analysis and forecast fields derived from the NWP system are objectively evaluated through comparisons with radiosonde and conventional surface observations. Comparisons with parallel runs of the HRM model starting from the 3D-Var operational analysis show that each of those observations have a measurable positive impact on forecast skill.

KEYWORDS: Objective Analysis, Data Assimilation, Meteorological Observation, Observing System Experiment, Impact Study